SP-Tune for Sony User Manual

Manual# 040726
Model: EBS-SP10

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1 Introduction

The SP-TUNE is a high quality TV Tuner/Scaler. The SP-TUNE supports advanced functionality, like video format /scan rate conversions, audio effects, Closed Captioning decoding and output, V-Chip functions, cloning capabilities (using the RS-232 port), Sleep Timer, etc.

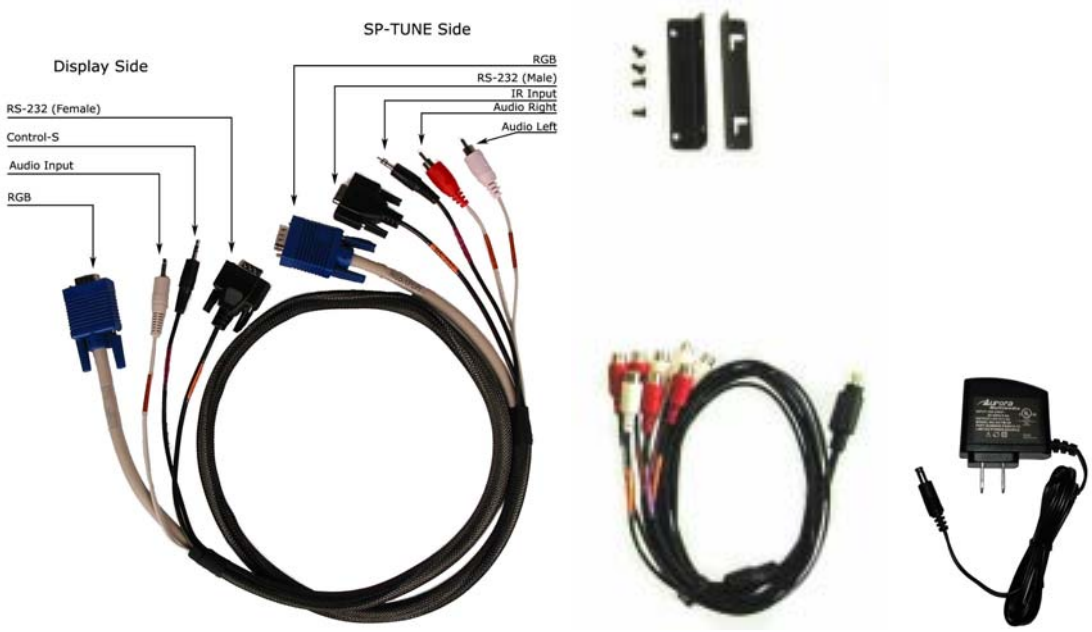
The SP-TUNE video/audio/control output is intended to be connected to various types of displays. The SP-TUNE uses the IR detector of the display device or can use the built in IR sensor.

2 Accessories

The accessories supplied are:

- 12v 15watt DC wall supply
- Pair of mounting ears
- Cable Harness (15pin – 15pin VGA, IR, Audio, RS-232)
- 8 pin mini DIN to 8 RCA Female audio I/O cable

All supplied components are shown on the picture below:



3 Supported IR transmitter(s) and basic key functions

The SP-TUNE is controlled using an IR remote controller. It utilizes IR receiver of the display via the Control S output port or the built in IR sensor.

The SP-TUNE unit is compatible with the Sony IR remote transmitter(s) below (see Fig.1 & 2). These transmitter(s) can be used to control the SP-TUNE.

Fig. 1

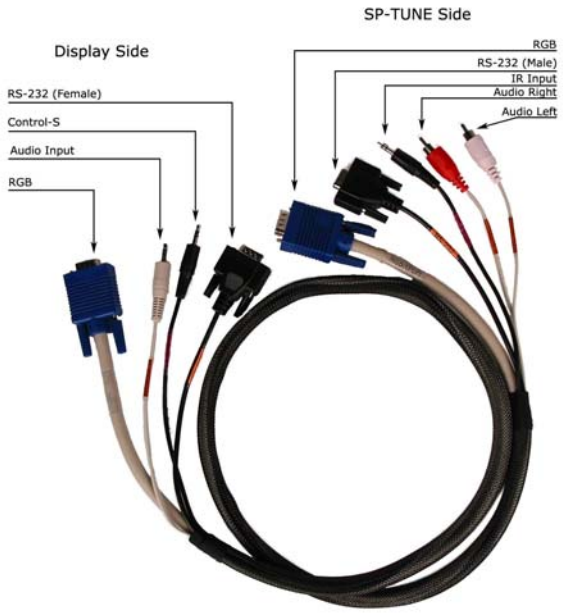
Fig. 2

For details of SP-TUNE operation refer to the corresponding chapter of this document. Below is a brief description of remote transmitters and the keys used for SP-TUNE control.

Fig. 1 IR Remote	*Function*
ON	Switch Power on
STBY	Switch Power off
ENTER	Select option in menu Also finishes input in dialog panels
VOLUME +	Raises volume level
VOLUME -	Lowers volume level
ARROWS	When menu active – move the cursor up/down/left/right
CHROMA	Exit the current menu or dialog
ID OFF	Displays the Menu
CONTRAST +	Channel Up
CONTRAST -	Channel Down
0..9, digits	When no dialog input active – directly enter tuner channel number to switch to. When dialog input active – enter digits.

4 Quick Start Guide

1. Make sure the SP-TUNE unit and the Sony Display are both disconnected from power.
2. Connect the SP-TUNE unit to the Sony Plasma Display using the supplied cable harness. Each cable on the harness is labeled for the appropriate connection. Make certain to plug the Control S phono connector into the Control S output of the display.



3. Connect the appropriate video source to input connectors of SP-TUNE (see “Connections” chapter for details).
4. Connect audio input/output to the 8-pin mini-DIN connector of SP-TUNE (see “Connections” chapter for details).
5. The RJ11 should be left unconnected as it is for Sony service purposes only. **Warning:** Damage may occur if plug into a phone line or other RJ-11 connectors unintended for the port. This will void the warranty.

6. Connect the power source to the Plasma Display (refer to Operating Instructions of the Display).
7. Connect the supplied 12v DC adapter to the SP-TUNE and the power outlet. Note that depending on pre-programmed settings the SP-TUNE can switch on automatically upon attaching power supply, or remain in a "sleep" state. In either case LEDs on SP-TUNE will blink for about half a second, then at least the upper LED should blink periodically (see the "LED functions" section for details).
8. The subsequent behavior of SP-TUNE depends on its mode of operation (see the "Operating Modes" chapter). A quick way to test correctness of setup is to use the "Power" key of Sony remote to switch the "Power" state of SP-TUNE on – (1) when pressing key on remote the upper LED should blink fast (signaling the IR signal reception); (2) the SP-TUNE and the panel should switch on, which should be observable on the panel.

5 Sony Plasma Settings

The EBS-SP10 (SP TUNE) is designed and tested to work with your Sony plasma monitor to provide TV Tuner source for flexible use. To experience the best possible image quality, suggested adjustments are recommended for your Sony plasma monitor.

EBS-SP10 Monitor Selection
The EBS-SP10 has a setting for which Sony Plasma monitor you are using with your TV tuner device. Enter the menu for the EBS-SP10 and under General Settings, select the correct model of your Sony plasma monitor.

Plasma Monitor Settings
Using the supplied remote, enter the Display Menu for the Sony monitor and adjust the following settings:

1) Picture Control Menu:
   For best Picture Mode for use of the EBS-SP10 with a Sony monitor, select **VIVID** mode (default is STANDARD)

2) Custom Setup Menu:
   Set RGB Mode to **DTV** (default is PC)

Screen adjustment (Horizontal / Vertical)
It may be necessary to adjust your display screen for best picture alignment on the first use of the EBS-SP10 with your Sony display. Using the supplied Sony remote, use the HSIZE, VSIZE, HSHIFT and VSHIFT buttons and make adjustments using the directional arrows until you fill the screen and align the image to your preferred setting.

TVs and Displays often "overscan" the image slightly to ensure that difference in channel signals are not reflected on the screen. You may choose to "overscan" the image and confirm that the image is filled on the screen for different channels used.

Model Specific Configurations

PFM-50X1
Null Modem Adapter Required
When using the EBS-SP10 with a Sony PFM-42V1 or PFM-42X1, a Null Modem adapter is provided for connection on the 9-Pin serial cable. This adapter is required for proper communication between the EBS-SP10 and the Remote input using an RS232 Cable.

PFM-42V1
Control-S Cable
Some older versions of the PFM-42V1 may require a different Control-S cable for proper IR Sensor control between the Plasma and EBS-SP10. These units can be identified by serial number:
Requiring Alternative Cable: PFM-42V1 Black S/N range 6500096 – 6501640
PFM-42V1 Silver S/N range 6535103 – 6539111

A standard stereo mini-jack audio cable used for PC audio can be used for this Control-S cable

6 LED functions

The two LEDs located on the SP-Tune indicate the current state of SP-TUNE and may be useful for troubleshooting.

During the startup (after powering on) the LEDs blink as the unit goes through self-test procedures and firmware booting. If, after connecting the power, LEDs do not show any activity, then probably there are problems with the power supply.

If the LEDs blink in alternative pattern -- upper/lower/upper/lower/etc – then the bootblock is active and no valid main firmware is detected. This can happen if, for instance, the preceding firmware update procedure was aborted for some reason. The bootblock waits for the new firmware upload, see the "Firmware update" section of this document.

During the normal functioning of SP-TUNE (when a valid firmware is loaded and self-test and startup procedures are finished, which takes about 2 seconds), the LED functions are:

Upper LED:

- Flashes for 50ms once in 6 seconds when SP-TUNE is attached to power supply, but is in "Power Off" ("sleep") state. Flashes for 50ms once in 3 seconds when SP-TUNE is in "Power On" state. This activity can be overridden by other activities of the same LED.
- Blinks fast when IR signal are detected. This can be used to see whether SP-TUNE receives any IR control packets or not. This does not mean that SP-TUNE recognizes any IR command.

Lower LED:

- Switches ON when a control packet is sent to Sony Display Panel through RS-232. Switched OFF when a valid reply to the control packet is received back. Therefore, if this LED is ON for a long time, probably there are problems with the Panel Connection (or Panel power supply).

The upper LED has also another purpose – if the SP-TUNE encounters an internal irrecoverable error, it stops all activities and starts blinking the upper LED in series (series of blinks, then a longer delay, then the series of blinks is repeated, so on).

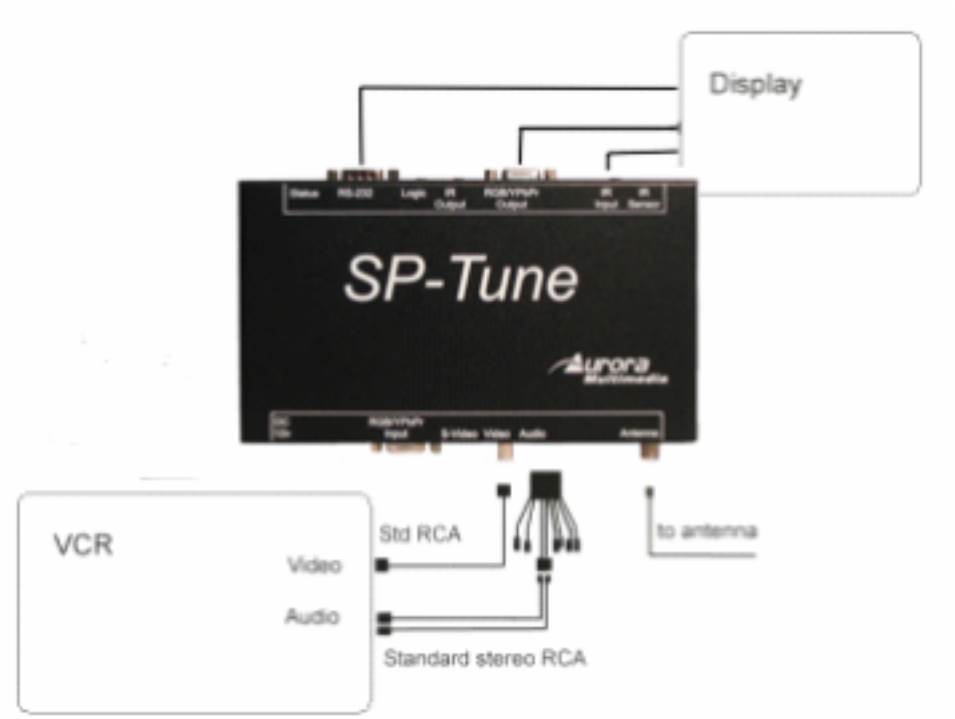
7 Connections

7.1 A/V & Control connectors

- Composite video input
- S-Video input (4-pin mini DIN)

- "VGA"-connector Component (RGB+syncs, RGB with sync on green, or YPbPr) video input
- Audio inputs/outputs (8pin mini DIN)
- RS-232 port for display control
- Logic input port for current sensors
- IR Output for IR control of devices without RS-232 control
- RGB/YPbPr Output (480i/p signal for display device)
- IR Input for direct connection of IR from remote photo receivers
- IR Sensor (Built in Photo Sensor)

Example of interconnections for a display device, SP-TUNE, VCR (or other source of composite video), and TV antenna or cable is shown below. Note that standard RCA cables for audio and video connections, standard S-Video cable, or RF antenna cables are not supplied with the SP-TUNE.



S-Video 4-pin mini-DIN connector is intended for S-Video signal input (VCR, DVD, other signal source).

The supplied audio input/output adapter cable has labels on cables near RCA connectors, indicating the purpose of each RCA connector. These labels are:

SVideo Left Audio
SVideo Right Audio
YPbPr Right Audio
YPbPr Left Audio
Video Left Audio
Video Right Audio
Line Out Left
Line Out Right

The respective audio input channels are selected when the corresponding video input is selected (e.g., S-Video input).

Component RGB+HV or YPbPr video signal can be connected to the 15-pin male connector of SP-TUNE:

- using the standard VGA cable for RGB+HV VGA signal;
- using the supplied adapter cable for YPbPr signal (Y=Green RCA, Pb=Blue RCA, Pr=Red RCA).

Different views of the SP-TUNE:

7.2 RF connector

The coaxial connector (ANT) of SP-TUNE is RF signal input – either aerial or cable TV, UHF/VHF, if the SP-TUNE shall be used as TV tuner.

7.3 RJ11 Service Port connector

RJ11 connector of SP-TUNE is used as a service port for Sony. Nothing should be connected to this port.

Warning: Damage may occur if plug into a different port such as a phone line. This will void the warranty.

7.4 Power connector

Connect the supplied 12v DC adapter to the power jack of the SP-TUNE unit.
Note that depending on pre-programmed settings the SP-TUNE can switch on automatically upon attaching power supply, or remain in a “sleep” state.

It is recommended to connect the power supply only after all other connections are done.

8 Operating the SP-Tune

The SP-TUNE has many advanced features to enhance the typical viewing and usability of a TV Tuner.

A user can switch the unit on or off, control volume level, switch the current TV channel, either directly entering channel number, or browsing through valid channels using Channel +/- keys (usually Arrow Up/Down key on a remote controller). “Valid” channels are the channels where a valid TV signal was discovered during recent “channel scan” operation (in stand-alone mode).
Since the SP-TUNE allows to attach several additional video signal sources to its AV inputs, to facilitate user selection of these inputs SP-TUNE maps some additional “channel numbers” to its AV inputs. So when a user selects one of these “channels”, the SP-TUNE switches to the respective AV input.

These reserved channel numbers are based on the values selected in the service menu and could be setup in many different ways as shown below.

26 - Composite video IN (Default is 126)
97 - S-Video IN (Default is 127)
108 - RGB+HV IN (Default is 128)
2 - YPbPr IN (Default is 129)

When a user changes to one of the channels above the appropriate input will display instead of the normal TV channel signal.

Note that RGB and YPbPr inputs actually share the same connection (15-pin female VGA-like), so channels 128 and 129 change only interpretation of this input. For instructions on selecting or changing a "channel" for an assigned input, please see section 7.6 "Map A/V Input to Channel"

More advanced functionality differs in different operating modes, which is described in more detail below and in the subsequent chapters of this document.

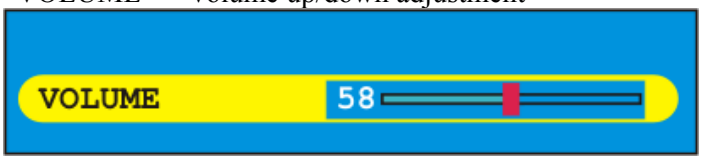
8.1 Remote Control Functions

In the Stand-alone and Service modes, the SP-TUNE is controlled using one of directly supported IR transmitters by Sony.

When no menu is active, usual keys of IR transmitter can be utilized to change volume level and switch channels. These control keys are:

Key: Volume+/- ("VOL")

"VOLUME " – volume up/down adjustment



Key: Contrast +/- ("CH")

Change TV channel. Number and label (if was defined) of the new channel is shown at top of screen for 5 seconds.

Keys: 0-9

Dialog: "SWITCH TO" – enter new channel number, several digits can be entered if necessary. Channel is switched to after a 3 seconds timeout (since the most recent digit is entered) or after pressing *TV/Video/FM* or *R* key.

Key: "ID OFF"

Enter the main configuration menu. See the Menu System chapter

Key: "Chroma"

Enter selections for the menu.

Key: "ON/STBY"

Switch SP-TUNE power on/off. The display panel is switched accordingly if it is connected using the RS-232 port or IR output port.

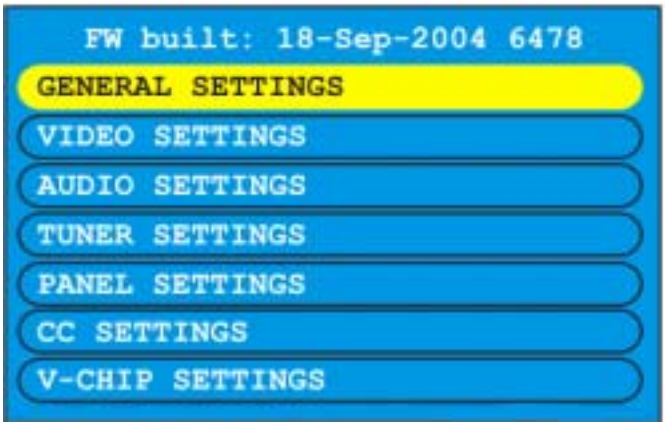
8.2 Menu Structure

The menu system allows a user to control various aspects of SP-TUNE configuration.

For all menus, up/down arrows move the cursor (yellow "selection" highlight) up/down. Central key selects the current submenu/option and finishes text entry (passwords, channel labels, etc.). Left/right arrow changes the currently active option, if possible.

When in "text edit" dialog (e.g., channel label editing), left/right arrows move the cursor left/right, up/down arrows change the character at the cursor.

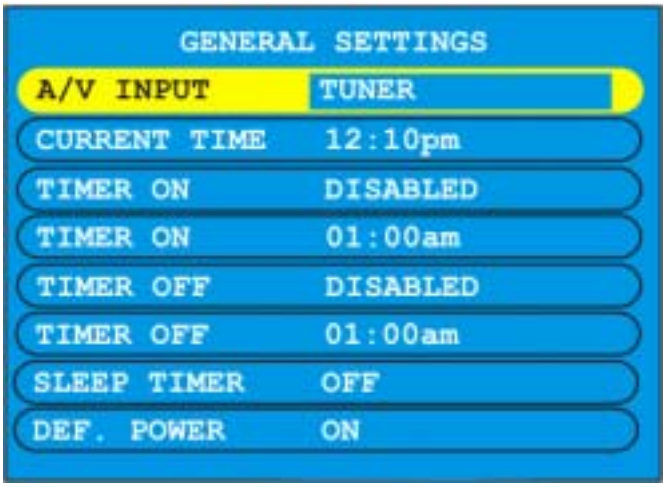
The main menu:



This menu allows a user to select the desired sub-menu for further configuration or to set default settings. "Set default settings".

These sub-menus are discussed in more detail in the subsequent chapters.

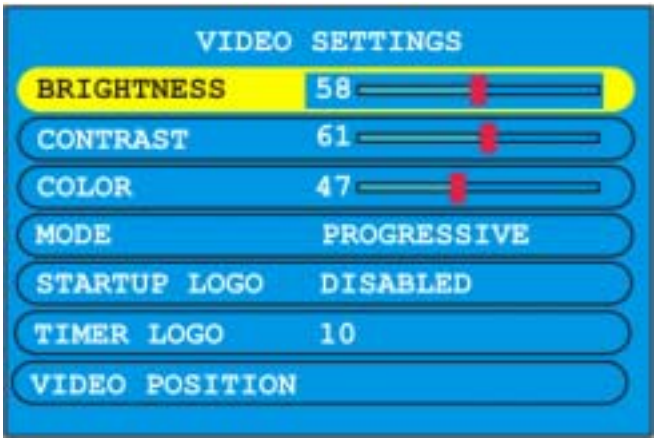
8.3 General Settings



This menu allows control of various "general" aspects of SP-TUNE behavior. Note that the *-marked options are accessible only in Service mode, and not in Stand-alone mode.

A/V Input – Allows user to select the audio/video input source (among the built-in Tuner and available AV-inputs)
Current time – Allows to set the current time
Timer On – Allows display turn on time enable/disable and the time at which it occurs
Timer Off – Allows display turn off time enable/disable and the time at which it occurs
Sleep timer – Allows user to set the sleep timer
Def. power – Configures default "power" state when the power is applied to the SP-TUNE (it is connected to the mains). "Off" means the SP-TUNE will remain in a "sleep" state after attaching power supply until switched on by IR transmitter command. "On" means the SP-TUNE will switch on automatically (no need to manually switch the power on after power supply connection).

8.4 Video Settings

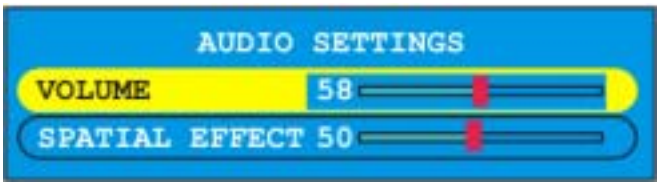


Brightness -- Controls the brightness of the picture.
Contrast -- Controls the contrast of the picture.
Color -- Controls color saturation (0 corresponds to grayscale picture)
Startup Logo -- Enabled or disables "logo" picture display after SP-TUNE powering on.

Timer Logo -- Time, in seconds, for which the "logo" picture is shown after SP-TUNE powering on.

Video Position -- Opens the "Video position" submenu, allowing control of picture position on screen.

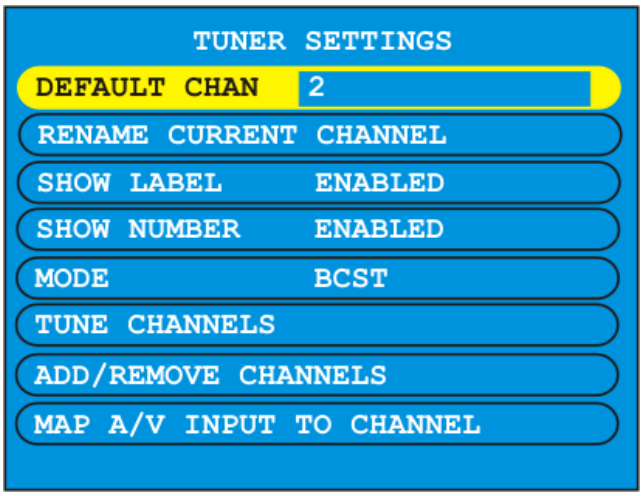
8.5 Audio Settings



Volume -- Selects the current (default) volume level

Spatial Effect -- Specifies the strength of 3D-spatial effect

8.6 Tuner Settings



Default Chan -- Specifies the default channel, which will be selected upon SP-TUNE power-up. If this default channel is set to "0" -- the default channel will be the last channel selected before the SP-TUNE was powered off.

Rename Current Channel
-- Change the text label assigned to the current channel. This label is shown (if enabled) on screen, along with the channel number, when the SP-TUNE is switched to this channel. Display of labels and channel numbers can be globally disabled on enabled, see the subsequent menu options.

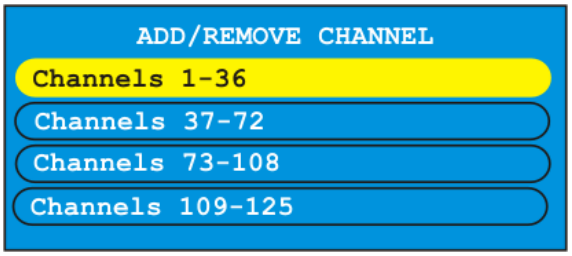
Show Label -- Setting to enable will show up to an 8 character label specific to the channel when changing channels.

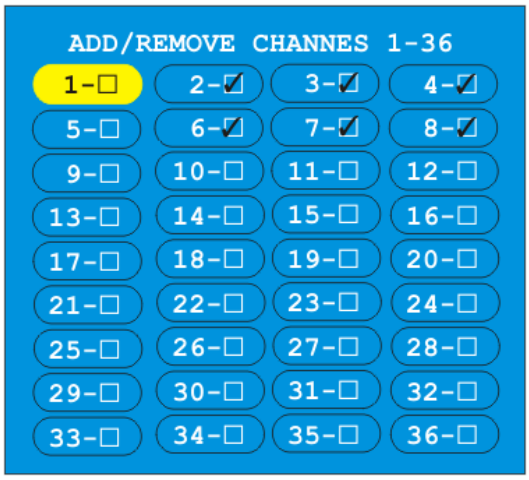
Show Number -- Setting to enable will show up the channel number when changing channels.

Mode -- Select tuner mode (channels allocation) to use, among broadcast and several cable options.

Tune Channels -- Scans the channels, looking for valid signal presence, and "remembers" which channels are valid and which are not. This "validity mask" is used then for

channel browsing using channel +/- buttons (so that a user browses through the defined channels only). Note that before this operation SP-TUNE must be connected to RF-antenna or cable TV.





Add/Remove Channels – Allows user to add or remove channels (edit the "validity mask") manually.

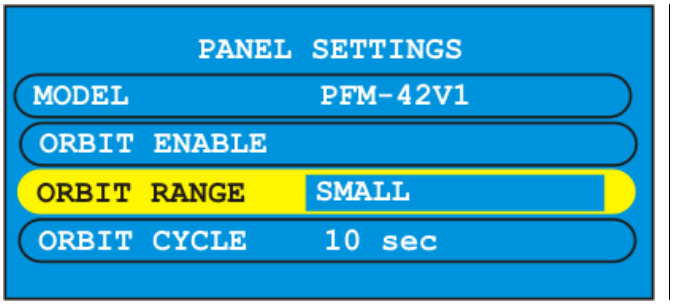
Map A/V Input to Channel – Allows user to make an association between a channel number and the AV inputs.

8.7 Panel Settings

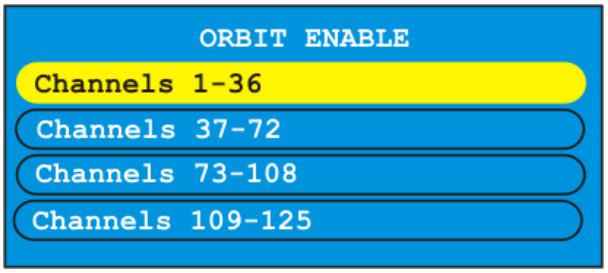
This menu controls various aspects of interaction with Sony Plasma Display through the RS-232 port. This menu is accessible in Service mode only (not in Stand-alone).

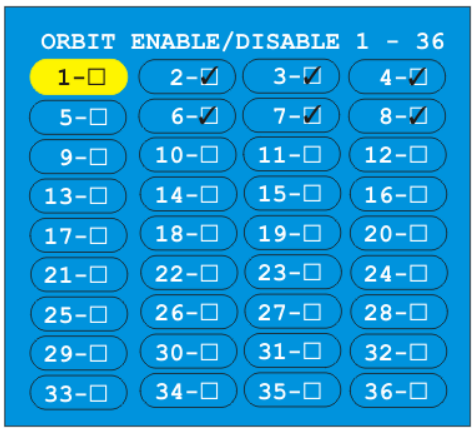
All these parameters do not affect behavior of SP-TUNE, they are transferred to Display Panel in control packets over the serial port and should be interpreted by Display Panel. If the panel control is disabled, all other options effectively do not affect anything.

Note that for the serial control interface to work, the Display Panel must be connected to SP-TUNE using the RS-232 cable.



Model -- This option controls the RS-232 protocol for the model selected and defaults the position, size, brightness, contras and RGB gains best suited.

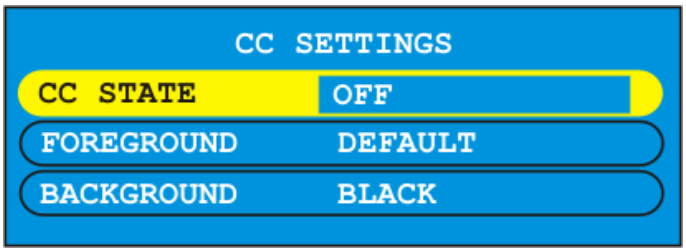




Orbit Enable -- Allows the enabling of Orbit mode on a per channel basis.
Orbit Range -- Selects how much orbit movement will occur.
Orbit Cycle -- Determines how often it will orbit.

8.8 CC Settings

This menu control Closed Caption decoder – CC signal type, and CC text color.



CC State -- CC decoder state: Off – Closed Caption output is switched off.
Foreground -- Color for CC text foreground.
Background -- Color for CC text background.

8.9 V-Chip Settings

This menu configures V-Chip parental control system.

V-Chip Limit -- Sets the threshold for program content indicator. Content rated as set in this option (and below) can be viewed using the TV. Content rated above the setting is rejected (red screen with message is shown).
Unrated chan. -- Allows to enable/disable viewing of "unrated" channels. Off=Do not allow viewing.

*- A user cannot change or reset password. Instead, to change the V-Chip limit user must enter the V-Chip password.

If the password is reset, the user is prompted to enter new password on his/her first access to V-Chip limit. For all subsequent accesses the user will have to use the password that was specified during the first access. In the event the password is forgotten the V-Chip settings can reset by holding the enter button for 5 sec. When prompted for the password enter right, left, right, left, enter and it will be reset to default values.

8.10 Troubleshooting

Symptom	***Checks***
Key on remote is pressed but nothing happens	See if the upper LED of SP-TUNE is fast-blinking while pressing key and aiming remote at IR sensor on Plasma Display. If it is not — check the batteries in the remote. If the batteries are good – check the cable connections between the Plasma Display and the SP-TUNE.
The Plasma Display does not turn on when the SP-TUNE is turned on.	Check Plasma Display power. Check SP-TUNE power (if the LEDs blink). Check SP-TUNE-plasma display connection cable.
No control of Plasma via RS-232 connection to Sp-Tune	Check cable connection. If connection is ok, check model number of plasma as some models require a null cable. Under panel settings check to see if correct model is selected.
Cannot switch to a particular TV channel using channel +/- browse keys.	The channel is selectable by browsing keys only if it is marked as “valid”. To be marked as “valid” the channel must have a good TV signal during the “channel scan” operation. Repeat the channel scan (making sure aerial/cable connection is good). Also the channel validity can be edited manually.

9 Firmware and Startup Picture update

The internal software of SP-TUNE (the firmware) can be updated. This may be necessary to fix errors corrected in the newer releases of the firmware, or to enhance functionality. The similar procedure is used to update the "logo picture" that can be shown by SP-TUNE for a predefined time after power on.

For the update procedure the serial port of the SP-TUNE must be connected to the RS-232 ("COM") port of a PC-compatible personal computer, running MS-Windows 98, 2k, or XP operating system. For this purpose a special cable, connecting the proper pins of 26-pin Plasma Display connector to COM port pins is required.

The picture loading and firmware update

Note that normally the serial port of SP-TUNE is used to control Plasma Display. In order for the port to be used for PC interface purposes, the serial Display control must be disabled.

Update procedure

1. Connect the SP-TUNE to PC using a 9pin-to-9pin RS232 null cable. Connect the power supply.
2. Switch the SP-TUNE on;
3. Use the supplied SPLdr.Exe utility to upload firmware or logo picture. This utility is Win32 command line (console) application. It can be run from within any application allowing to specify command line (the simplest example is Windows Start\Run dialog. The command line syntax is:

   ```
   SPLdr.Exe <port_number> <filename>
   ```

   where

   <port_number> is a COM port number to which the SP-TUNE is connected (1-based, that is, for COM1 this number is 1).

   <filename> is the path and name of the file to be uploaded. Must be either *.BMP file (bitmap) or *.DLD (SP-TUNE firmware) file.

   Example command line to load new bitmap file is:

   ```
   SPLdr.Exe 1 logo1.bmp
   ```

   In this case the COM1 port is used and the new logo file to be uploaded is "logo1.bmp" located in the current directory. If the SPLdr application or the file to be uploaded is not located in the current directory, full file path can be pre-pended to the respective file name.

   When uploading the file, SP-TuneLdr.Exe outputs the current load percentage and other state messages to console, along with error messages.

   After the successful update the SP-TUNE firmware is restarted automatically.

   If the loaded firmware image is not valid (its header or checksum do not match the expected), this firmware will not be loaded upon startup. Instead, the control will remain in bootblock, which will wait for the new firmware image to be uploaded. This is indicated by LEDs "alternate" blinking low/high/low/etc.

File format for logo picture BMP file

SPLdr.Exe supports conversion and loading of standard 24-bit unpacked RGB MS *.BMP files. The recommended picture size is 852x480 pixels (width is 852 pixels, height is 480 pixels).

10 Specifications

10.1 Power source

12v 15 Watt DC wall supply
5.65 Watts Maximum with 12v DC input

10.2 Applicable signals

Color system: NTSC (RF and AV inputs)
Scanning format: 525i (480i), 525p (480p)

Receiving RF signals – US Standard Air, US Standard Cable, Cable HRC, Cable IRC

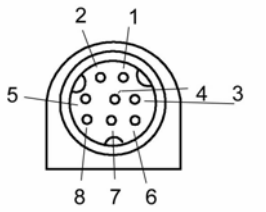
Supported audio standards: auto-detection, BTSC-STEREO, BTSC-MONO+SAP

Serial port – RS-232C compatible, can be used for Plasma Display control, firmware update, and SP-TUNE control/diagnostics. Baud rate – 9600 (for Display control) or 115200 (for other purposes). 8 bits data, 1 start bit, 1stop bit, no parity bit.

10.3 Connection terminals

Video IN (RCA)
S-Video IN (Mini DIN 4pin)
Component YPbPr/RGB+HV IN – 15-pin female VGA-compatible connector.
Audio stereo IN/OUT – 8 pin mini DIN. Requires adapter cable with 4 pairs of RCA connectors.
ANT (aerial) IN – RF UHF/VHF
Sony Service Port – RJ11
Component YPbPr/RGB+HV OUTPUT – 15-pin female VGA-compatible connector.
IR IN – 3.5mm TRS (Tip – Signal, Ring – 12v (if jumped internally), Sleeve – Ground)
IR OUT – 3.5mm TRS (Tip – Signal, Ring – NA, Sleeve – Ground)
RS-232 – DB9 Connector (2- RX, 3- TX, 5- Ground)
Logic IN – 3.5mm TRS (Tip – Input Signal, Ring – NA, Sleeve – Ground)

8 Pin Mini-DIN Audio connector pinout:



1 – SVideo audio Right IN
2 – YPbPr audio Left IN
3 – Composite audio Right IN
4 – SVideo audio Left IN
5 – Right Line OUT

6 – Composite audio Left IN
7 -- YPbPr audio Right IN
8 -- Right Line OUT

10.4 Dimensions

Height: 0.96”
Depth: 4.18”
Length: 7.30” Plus 1.39” (35.3 mm) with mounting brackets

10.5 Weight

Approx. 0.8 lbs for SP-Tune unit and 2 lbs with all accessories and boxed

11 Limited Warranty

Aurora Multimedia Corp. Warrants that this product is free of defects in both materials and workmanship for a period of 24 months for parts and labor from date of purchase. During the warranty period, and upon proof of purchase, the product will be repaired or replaced (with same or similar model) at our option without charge for parts or labor for the specified warranty period (24 months parts and labor).

This warranty shall not apply if any of the following:

A) The product has been damaged by negligence, accident, lightning, water, act-of-God or mishandling; or,
B) The product has not been operated in accordance with procedures specified in operating instructions: or,
C) The product has been repaired and or altered by other than manufacturer; or,
D) The product's original serial number has been modified or removed: or,
E) External equipment other than supplied by manufacturer, in determination of manufacturer, shall have affected the performance, safety or reliability of the product.

In the event that the product needs repair or replacement during the specified warranty period, product should be shipped back to Manufacturer at Purchaser's expense. If requested, an estimate of any applicable charges will be given before the repairs are made.

No other warranty, express or implied other than Manufacturer's shall apply.

Manufacturer does not assume any responsibility for consequential damages, expenses or loss of revenue or property, inconvenience or interruption in operation experienced by the customer due to a malfunction in the purchased equipment. No warranty service performed on any product shall extend the applicable warranty period.

This warranty does not cover damage to the equipment during shipping and Manufacturer assumes no responsibility for such damage.

This product warranty extends to the original purchaser only and will be null and void upon any assignment or transfer.

12 FCC Part 15 Statement

RADIO AND TELEVISION INTERFERENCE
This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and the receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

You may also find helpful the following booklet, prepared by the FCC: "How to Identify and Resolve Radio-TV Interference Problems." This booklet is available from the U.S. Government Printing Office, Washington D.C. 20402.
Changes and Modifications not expressly approved by the manufacturer or registrant of this equipment can void your authority to operate this equipment under Federal Communications Commissions rules.
In order to maintain compliance with FCC regulations shielded cables must be used with this equipment. Operation with non-approved equipment or unshielded cables is likely to result in interference to radio & television reception.